REMARKS

This paper is being provided in response to the Office Action dated November 10, 2008, for the above-referenced application. In this paper, Applicants have cancelled claims 17, 32-42, 46-69 and 75 (claims 3, 43 and 44 having been previously cancelled) without prejudice or disclaimer of the subject matter thereof. Further, as noted below, to correct typographical errors in claim numbering, Applicants have cancelled claims 72-74 affected by the misnumbering and added new claims 76 and 77 (reflecting the subject matters formerly identified as claims 73 and 74), and have amended claims 1, 5, 15, 16, 23, 29 and 45to clarify that which Applicants consider to be the presently-claimed invention. Applicants respectfully submit that the amendments to the claims and the new claims are fully supported by the originally-filed specification, consistent with the discussion herein.

The objection to claims 73-75 for informalities due to claim misnumbering has been addressed by amendments herein by cancellation of the claims affected by the misnumbering and the addition of new claims 76 and 77 that reflect the subject matters formerly identified as claims 73 and 74. Accordingly, Applicants respectfully request that the objection be reconsidered and withdrawn.

The rejection of claim 17 under 35 U.S.C. 112, second paragraph, has been rendered moot by the cancellation herein of claim 17 without prejudice or disclaimer of the subject matter thereof.

The rejection of claims 1, 2, 4, 7, 12-15, 19-20, 26-28, 45, 70 and 71 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,152,949 to Leoni, et al. (hereinafter "Leoni") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

Independent claim 1, as amended herein, recites a mold assembly for generating a composite part from a strengthener in a generally solid phase and a matrix in a generally liquid phase. The mold assembly includes a base mold including a strengthener chamber for receiving the strengthener, a matrix injection inlet for injecting the matrix in said strengthener chamber and an evacuation outlet, said inlet and said outlet defining a propagation direction. A cover mold is provided that includes a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated, and a fluid control aperture for injecting a controlling fluid in said compression chamber; said cover mold being so configured as to be sealingly mounted on said base mold whereby said strengthener chamber and said compression chamber are adjacent, wherein said controlling fluid is an incompressible fluid. A deformable member is provided in a gap defined by said strengthener chamber and said compression chamber, said deformable member being so configured as to pressurize the matrix toward the strengthener and propagate the matrix along said propagation direction upon compression exerted on said deformable member by the controlling fluid. Claims 2, 4-16, 18-31, 70, 71 and new claims 76 and 77 depend from independent claim 1.

Independent claim 45, as amended herein, recites a mold assembly for generating a composite part from a strengthener and a matrix. The mold assembly includes a base mold including a strengthener chamber for receiving the strengthener, a matrix injection inlet for injecting the matrix in said strengthener chamber and an evacuation outlet, said inlet and said outlet defining a propagation direction. A cover mold is provided including a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated, and a fluid control aperture for injecting a controlling fluid in said compression chamber; said cover mold being so configured as to be sealingly mounted on said base mold whereby said strengthener chamber and said compression chamber are adjacent, wherein said controlling fluid is an incompressible fluid. A deformable member is provided in a gap defined by said strengthener chamber and said compression chamber, said deformable member generating a deformation zone in said compression chamber from a portion of the matrix permeating the strengthener, said deformable member being pressurized by the controlling fluid in proximity of said deformation zone for redirecting the portion of matrix generating said deformation zone back to the strengthener and for propagating the matrix along said propagation direction.

Leoni discloses a tooling method for resin transfer molding. The molding apparatus includes a compliant mold subassembly having one or more conformable cauls and a complementary, non-permeable membrane that function, in combination, as a semi-rigid

molding tool. The Office Action cites principally to elements of Figure 1 and col. 7, lines 55-68, col. 9, lines 53-62 and col. 10, lines 5-50 of Leoni.

Applicants' independent claim 1 has been amended herein to describe the combination of (a) a controlling fluid which is incompressible and (b) a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated. Applicants note that when the controlling fluid is an incompressible liquid such as water, oil or any other liquid as described in paragraph [0102] of the originally-filed specification the pressure applied by the controlling fluid 78 (Figure 12) on the membrane 36 progressively reduces the deformation of the membrane 36, compacts the strengthener 66 and forces both the matrix which is already in the impregnated strengthener volume 72 and the free matrix in the deformation zone 74 along its longitudinal extension (paragraph [0103]). As described in paragraph [0104] this has the effect of bringing the penetration of the matrix toward the un-impregnated strengthener volume 80 and enables to control the progression of the matrix flow front 76 through the strengthener 66 along the propagation direction.

Paragraph [0123] of originally-filed specification further describes that adjustability of thickness h (Figure 6) is used in cases where final thickness of the composite part is not uniform. In fact, as described in paragraph [0140], with an incompressible fluid, isotropic compression is exerted on the strengthener 266. Due to the non-compressibility of the fluid 278, local deformations of the membrane 236 in the saturated zone of the strengthener 266 generally imply

a deformation in the opposite direction and of equivalent volume in the non-saturated zone of the strengthener 266.

This is a reason why, as described in paragraph [0080] of the originally-filed specification referring to Figures 5 and 6, a compression chamber 52 of the cover mold 34 comprises a compression wall 54 and peripheral walls 56, and has a geometry which is generally determined by the configuration of the part to be molded. In this respect, Figures 13, 25 and 33 show that using an incompressible fluid 59 tends to render a thickness of the compression chamber uniform, whereby the geometry of the compression wall influences on the configuration of the part to be generated.

Applicants respectfully submit that Leoni does not teach or fairly suggest the above-noted features that are recited by Applicants in amended independent claim 1, including the combination of (a) a controlling fluid which is incompressible and (b) a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated. Referring to Figure 1 of Leoni, the geometry of the pressure chamber 38 is not determined by the configuration of the piece 32 being molded through the membrane 36, Accordingly, the molding process cannot operate like that described above in connection with Applicants' claimed features. For that reason, the mold of Leoni et al. is usable with semi-rigid shaped members formed from a fiber-reinforced elastomeric material (see column 5, lines 42-44 of Leoni).

Since amended claim 45 also recites the combination of (a) a controlling fluid which is incompressible and (b) a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated, the above comments equally apply to amended claim 45.

Accordingly, Applicants respectfully submit that Leoni does not teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claims 1, 2, 4, 7-15, 18-19, 21-23, 25-28, 45, and 70-74 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,506,325 to Cartwright (hereinafter "Cartwright") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claims 1 and 45 are discussed above. The remaining claims depend therefrom.

Cartwright discloses a method for controlling the exotherm of a vacuum resin infusion. A mold is provided onto which a reinforcing material is placed. The reinforcing material is sealed with an impervious sheet and the temperature of the reinforcing material and resin is regulated by placing a fluid in contact with the impervious sheet and regulating the temperature

of the fluid. The Office Action cites principally to elements of Figure 1 and col. 4, lines 44-47 and col. 5, lines 30-61 of Cartwright.

In Figure 1 of Cartwright, a lid or cap 138 is placed on top of a mold 110. This lid or cap 138 does not form a cover mold and does not form a mold chamber having a geometry determined by the configuration of the part to be generated, more specifically the configuration of the substrate 112 infiltrated with resin.

The embodiment of Figure 2 of Cartwright comprises no cover mold. Referring to Figure 2 of Cartwright, a fiber substrate 212 is placed on a mold 210. A fluid impervious bag 214 is placed over the substrate 212 and sealed to the mold 210. A second fluid impervious bag 215 is placed over the first bag 214 and sealed. A vacuum controller 218 provides a vacuum via a line 216 to the area between the first bag 214 and the substrate 212. A resin source 222 introduces resin via a line 220 into the substrate 212. A fluid controller 228 provides a fluid via lines 230, 232 in the space between bags 214 and 215 and may control such things as the motion of the fluid (to improve heat transfer), the pressure applied to the bag and the temperature of the bag.

An additional layer 217 may be disposed between bag 214 and bag 215 and may be textured for providing channels for the fluid to flow through during the infusion of the resin.

The process for the system illustrated in Figure 2 of Cartwright is conducted as follows. After assembly of the mold, substrate, and bagging material, a vacuum is created via vacuum controller 218 via line 216. The vacuum removes air from the cavity or envelope 213 and

collapses the bags 214, 215. The pressure differential across the envelope 213 pulls resin from resin source or controller 222 through line 220. Resin will thereafter flow from the bottom of the mold 210 to the top of the substrate and impregnate the pre-form 212 with the resin material. Fluid controller 228 controls the motion, pressure and temperature of fluid located between the inner bag 214 and the outer bag 215 during the curing process.

The embodiment of Figure 2 of Cartwright fails to teach the combination of (a) a controlling fluid which is incompressible and (b) a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated.

The embodiment of Figure 3 of Cartwright uses a substrate 312 placed on a planar mold 310. A fluid 326 is provided in contact with a bag 314 placed on the substrate 312. The mold 310, substrate 312 and fluid 326 are positioned in a container 350 provided with a lid 328.

The embodiment of Figure 3 of Cartwright comprises no cover mold defining a cover mold. Moreover, the embodiment of Figure 3 of Cartwright comprises no compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated.

Operation of the method of Cartwright is based on the use of a substrate. As described between column 3, line 62 and column 4, line 7, the substrate is comprised of a permeable,

reinforced fibrous material such as a laminate or preformed cloth which is placed on top of the mold. Other types of reinforcing material structures known in the art, such as woven roving mat, continuous roving mat, or chopped mat may be used instead of or in addition to cloth. Furthermore, chopped fibers, continuous roving or certain fillers can also be used for this laminate if desired. The material for the reinforcing cloth or fibers may be any of a number of known materials that are utilized for vacuum resin transfer molding purposes, such as carbon, fiberglass, kevlar, nylon, graphite, or the like.

Accordingly, Applicants respectfully submit that Cartwright does not teach or fairly suggest at least the features of the combination of (a) a controlling fluid which is incompressible and (b) a compression chamber defining a compression wall substantially uniformly spaced apart from the composite part to be generated and having a geometry substantially conforming to a configuration of the composite part to be generated, as recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claim 5 under 35 U.S.C. 103(a) as being unpatentable over either Leoni or Cartwright in view of U.S. Patent No. 6,257,866 to Fritz, et al. (hereinafter "Fritz") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Leoni and Cartwright. Claim 5 depends therefrom.

Fritz discloses an apparatus for accurately forming plastic sheet. The Office Action cites to Fritz as disclosing a base mold with a contact wall, peripheral walls and shoulders with a pin or projection which secure to a cover mold.

Applicants respectfully submit that Fritz does not overcome the above-noted deficiencies of Leoni or Cartwright with respect to Applicants' presently-claimed invention. Fritz does not disclose, nor is Fritz cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Leoni and Cartwright. Accordingly, Applicants submit that neither Leoni, Cartwright nor Fritz, taken alone or in any combination, teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claim 6 under 35 U.S.C. 103(a) as being unpatentable over either Leoni or Cartwright in view of U.S. Patent No. 6,250,909 to Segen, Jr. (hereinafter "Segen") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Leoni and Cartwright. Claim 6 depends therefrom.

Segen discloses a web clamp for thermoforming processes. The Office Action cites to Segen as disclosing clamping units with a generally triangular cross-section, citing specifically to Figures 4a-c of Segen.

Applicants respectfully submit that Segen does not overcome the above-noted deficiencies of Leoni or Cartwright with respect to Applicants' presently-claimed invention. Segen does not disclose, nor is Segen cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Leoni and Cartwright. Accordingly, Applicants submit that neither Leoni, Cartwright nor Segen, taken alone or in any combination, teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claim 16 under 35 U.S.C. 103(a) as being unpatentable over either Leoni or Cartwright in view of U.S. Patent No. 4,942,013 to Palmer, et al. (hereinafter "Palmer") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Leoni and Cartwright. Claim 16 depends therefrom.

Palmer discloses a vacuum resin impregnation process. The Office Action cites to Palmer as disclosing the use of multiple or deformable membranes which contact a chamber wherein a strengthener is impregnated with resin, and which include a gas permeable layer, citing specifically to col. 7, lines 50-56 of Palmer.

Applicants respectfully submit that Palmer does not overcome the above-noted deficiencies of Leoni or Cartwright with respect to Applicants' presently-claimed invention. Palmer does not disclose, nor is Palmer cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Leoni and Cartwright. Accordingly, Applicants submit that neither Leoni, Cartwright nor Palmer, taken alone or in any combination, teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claim 17 under 35 U.S.C. 103(a) as being unpatentable over either Leoni or Cartwright in view of U.S. Patent No. 6,033,203 to Christensen, et al. (hereinafter "Christensen") has been rendered moot by the cancellation herein of claim 17. Applicants note that Christensen discloses tooling for vibration assisted processing of viscous thermoplastics, and does not disclose, nor is cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Leoni and Cartwright.

The rejection of claim 24 under 35 U.S.C. 103(a) as being unpatentable over Cartwright in view of U.S. Patent No. 5,093,067 to Gibson (hereinafter "Gibson") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Cartwright. Claim 24 depends therefrom.

Gibson discloses injection molding of fabric reinforced elastomeric diaphragms. The Office Action cites to Gibson as disclosing the formation of a flexible diaphragm via the injection of resin material into a gap between two molds, citing specifically to Figure 2c of Gibson.

Applicants respectfully submit that Gibson does not overcome the above-noted deficiencies of Cartwright with respect to Applicants' presently-claimed invention. Gibson does not disclose, nor is Gibson cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Cartwright. Accordingly, Applicants submit that neither Cartwright nor Gibson, taken alone or in any combination, teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

The rejection of claims 29-31 under 35 U.S.C. 103(a) as being unpatentable over Leoni or Cartwright in view of U.S. Patent No. 5,439,635 to Seemann (hereinafter "Seemann") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to Leoni and Cartwright. Claims 29 - 32 depend therefrom.

Seemann discloses a unitary vacuum bag for forming fiber reinforced composite articles and a process for making the bag. The Office Action cites to Seemann as disclosing that a cover

mold or bag is configured with a series of grooves or elongated flow conduits, citing specifically to col. 1, lines 40-50, col. 3, lines 60-65 and col. 5, lines 62-68 of Seemann.

Applicants respectfully submit that Seemann does not overcome the above-noted deficiencies of Leoni or Cartwright with respect to Applicants' presently-claimed invention. Seemann does not disclose, nor is Seemann cited in the Office Action in connection with, Applicants' recited features that are discussed above with respect to Leoni and Cartwright. Accordingly, Applicants submit that neither Leoni, Cartwright nor Seemann, taken alone or in any combination, teach or fairly suggest at least the above-noted features that are recited by Applicants. In view of the above, Applicants respectfully request that the rejection be reconsidered and withdrawn.

Based on the above, Applicants respectfully request that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 508-898-8603.

Respectfully submitted,
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Date: April 9, 2009

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